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HDP/SB/21 based on PTO/SB/21 (08-00)

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/608,086
Filing Date	June 30, 2003
Inventor(s)	William E. RUSSELL, II et al.
Group Art Unit	3663
Examiner Name	Rick Palabrica
Attorney Docket Number	24GA05998-7 (8564-000045/US/DVA)

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Letter to the Official Draftsperson and _____ Sheets of Formal Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance Communication to Group
- ☐ REPLY BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group *(Notice of Appeal, Brief, **Reply Brief**)*
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) *(please identify below)*:

Remarks

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Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Ryan E. Alley	Reg. No. 60,977
Signature			
Date	February 14, 2008		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	William E. Russell, II et al.	Conf.:	8107
Appl. No.:	10/608,086	Group:	3663
Filed:	June 30, 2003	Examiner:	Ricardo Palabrica

For: SYSTEM AND METHOD FOR CONTINUOUS OPTIMIZATION OF CONTROL VARIABLES DURING OPERATION OF A NUCLEAR REACTOR

Docket No.: 24GA05998-7 (8564-000045/US/DVA)

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February 14, 2008

APPELLANT'S REPLY BRIEF UNDER 37 C.F.R. § 41.41

Sir:

In response to the Examiner's Answer mailed December 14, 2007, Applicants request the appeal be maintained and supply the following arguments in reply under 37 C.F.R. § 41.41(a)(1).

I. STATUS OF CLAIMS:

Applicants acknowledge the Examiner's indication that the status of the claims in the appeal brief is correct. Claims 31-41 are pending in the application, with claim 31 being written in independent form.

Claims 31-39 stand rejected under 35 U.S.C. § 103(a) as being obvious over US Pat 4,080,251 to Musick ("Musick") in view of any one of "Winning Strategies for Maintenance Optimization at U.S. NPPs" by Dozier et al. ("Dozier"), "The Energy Supply for the United States & the Role of Nuclear Energy" by Knollenberg ("Knollenberg"), and "The Economics of Nuclear Energy" by Pryor, Jr. ("Pryor").

Claims 40 and 41 stand rejected under 35 U.S.C. § 103(a) as being obvious over Musick in view of any one of Dozier, Knollenberg, and Pryor, in further view of US Pat 5,009,833 to Takeuchi et al. ("Takeuchi").

Claims 31-41 are being appealed.

II. GROUNDS OF REJECTION TO BE REVIEW ON APPEAL:

Appellants seek the Board's review of the following rejections:

1. Claims 31-39 under 35 U.S.C. §103(a) being obvious over US Pat 4,080,251 to Musick ("Musick") in view of any one of "Winning Strategies for Maintenance Optimization at U.S. NPPs" by Dozier et al. ("Dozier"), "The Energy Supply for the United States & the Role of Nuclear Energy" by Knollenberg ("Knollenberg"), and "The Economics of Nuclear Energy" by Pryor, Jr. ("Pryor").

2. Claims 40-41 under 35 U.S.C. § 103(a) as being obvious over Musick in view of any one of Dozier, Knollenberg, and Pryor, in further view of US Pat 5,009,833 to Takeuchi et al. ("Takeuchi").

III. ARGUMENTS:

A. CLAIMS 31-41 ARE NOT OBVIOUS UNDER 35 U.S.C. § 103(a).

With respect to the rejections under § 103, claims 31-39 rise and fall together and claims 40-41 rise and fall together.

i. Claims 31-39

The Examiner argues in his Answer that Musick inherently teaches "performing an optimization process . . . to generate one or more independent control variable values," as recited in claim 31, by teaching plant operation at maximized plant capacity within calculated design limits.[1] The Examiner further argues that any of Dozier, Knollenberg, and Pryor show that maximized plant capacity necessarily optimizes an independent control variable.[2]

Applicants respectfully reply that Musick, alone or combined with Dozier, Knollenberg, or Pryor, does not generate any independent control variable values, let alone through an optimization process, as required by claim 31. To reiterate, "independent control variables" are operational controls that can be individually changed during operation of the reactor, including controls like control blade position and core flow rate.[3] Generating values for these independent control variables generates exact settings that may be implemented in the plant for optimized performance. For example, a number of inches of control blade insertion may be an independent control variable value generated in claim 31.

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[1] *See* Examiner's Answer mailed December 14, 2007 ("Answer"), pp. 5-7, 9-10.
[2] *See* Answer, pp. 7, 10.
[3] *See* Specification as Filed, ¶¶ [0002]-[0003].

Musick teaches generation of dependent variable design limits, as previously stated in the Applicants' Appeal Brief and stipulated by the Board,[4] and nowhere generates or provides specific independent control variable values. Musick's design limits do not yield values at which operational controls may be specifically set for optimized performance. Rather, the design limits in Musick indicate values of dependent performance variables, such as Departure from Nucleate Boiling Ratio (DNBR), that trigger plant shut down.[5] No independent control variable values are generated by this design limit calculation, let alone generated by an optimization process.

The Examiner's reliance on Musick's maximization of plant capacity and availability within generated limits does not supply, expressly or inherently, any value for an independent control variable. Further, none of Dozier, Knollenberg, or Pryor disclose how or where Musick's maximization of plant capacity within design limits generates independent control variables. Dozier, Knollenberg, and Pryor, as explained by the Examiner himself, teach only that optimization may include maximized plant availability and capacity within particular design limits.[6]

Lastly, in response to the Applicants' arguments that none of the applied references teach or suggest generating independent control variables via an optimization process as recited in claim 31, the Examiner replies that Musick inherently generates such values as evidenced by the following passage:

> It is the function of COLSS to make a very accurate calculation of a DNBR operating limit which contains sufficient margin to allow the core protection calculator to sense, calculate, predict and shut down the reactor

[4] *See* Col. 6, ll. 15-18; Opinion in Support on Decision, Appeal No. 2006-1486, p. 4.
[5] *See* Col. 8, ll. 35-51; Col. 9, ll. 26-33.
[6] *See* Answer, p. 6.

> in a timely fashion that avoids the violation of any fuel design limits. The operating limit thus generated may be utilized in either of two fashions in order to control the operation o the reactor. The first is merely to register the limit on a visual indicator 170 which would allow the reactor operator to compare the actual reactor operating condition to the COLSS limit. With this knowledge available to the operator, he will be able to operate the reactor in such a way that a sufficient margin is continuously maintained while at the same time maximizing the capability and availability of the reactor. The second method would be to automatically restrict the plant power to be within the COLSS limit thereby insuring that the necessary margin is maintained.[7]

Applicants respectfully reply that this passage shows calculation of a dependent performance variable design limit (in this case, a DNBR limit) and its display or automatic avoidance. No independent control variable, such as core flow rate, is generated or displayed to the operator; rather, it is left up to the operator or automatic method to adjust any independent control variables (or trip the plant), as they decide, to avoid breaching the dependent performance variable design limit. This is not generating an independent control variable value through an optimization process as recited in claim 31.

Because the applied references fail to teach or fairly suggest each and every feature of claim 31 as argued herein and in Applicants' Appeal Brief, the references cannot anticipate or render obvious claims 31-41.

ii. Claims 40-41

The Examiner supplies in his Answer a rationale as to how Musick in view of any one of Dozier, Knollenberg, and Pryor in further view of Takeuchi teach each and every element of claim 40.[8] In his Answer, the Examiner argues that DNBR (discussed above)

[7] Col. 12, ll. 6-27.

qualifies as a transfer function and is used appropriately in Musick to meet the elements of claim 40.

Applicants respectfully reply that DNBR cannot meet the definition of a transfer function as recited in claim 40. Specifically, claim 40 recites:

> first simulating nuclear reactor operation for sets of independent control variable values to produce associated sets of dependent performance variable values;
>
> generating transfer functions based on the sets of independent control variable values and the sets of dependent performance variable values, the transfer functions representing functional relationships between the independent control variables and the dependent performance variables; and
>
> determining a set of independent control variable values for possible use in operating the operating nuclear reactor using the transfer functions.

Musick teaches that DNBR is generated from an equation using a single "set" of measured independent control and calculated dependent performance variables.[9] DNBR is not a functional relationship between independent and simulated dependent variables but is instead a function of these measured and calculated variables. Thus Musick, even if supplemented with the simulation taught in Takeuchi, fails to disclose the transfer functions as defined in claim 40 by its teaching of a DNBR.

Because the applied references, alone or in combination, fail to teach or fairly suggest each and every feature of claim 40, the references cannot anticipate or render obvious claims 31-41.

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[8] *See* Answer, pp. 7-8.
[9] See Col. 20, ll. 17-30.

B. CONCLUSION:

Appellants respectfully request the Board to reverse the Examiner's anticipation and/or obviousness rejections of claims 31-41.

The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,
HARNESS, DICKEY, & PIERCE, P.L.C.

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